2001 National Survey of Hospital Coagulation Laboratory Practices:

Test Ordering and Result Reporting

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Introduction

Hospital clinical laboratories play an important role in healthcare; and as documented in this survey, an estimated 97% of hospital laboratories reported performing coagulation tests. Coagulation tests are known to be vital to the diagnosis, treatment and management of bleeding and hypercoagulability disorders, and the majority of them are performed to screen for coagulation disorders or to monitor therapeutic anticoagulant therapy. In response to the uncertainty surrounding coagulation testing practices, we conducted this survey of hospital coagulation laboratories in the US, and chose hospitals as the testing environment to address a broader spectrum of in-house testing practices not subject to observation in physician office laboratories or other point-of-care testing sites. The purpose of this survey was to evaluate the availability of coagulation tests, assess various pre-analytical, analytical and post-analytical stages of the testing process, and evaluate some testing practices critical to clinical management of patients. This paper presents reported practices relating to coagulation quality assurance (QA) practices. In this report, we review selected findings relative to coagulation laboratory test ordering and result reporting practices. The survey used and a summary of our findings can be found at http://www.phppo.cdc.gov/mlp/coag2001.asp.

Methods

A group of coagulation laboratory experts and survey methodologists assisted the CDC in the development as well as the evaluation of the content and format of this 2001 survey of hospital coagulation laboratory directors (response rate, 79%). Furthermore, several versions of the survey were pilot tested in 9 hospital coagulation laboratories before its final dissemination. From a sampling frame of institutions listed in the 1999 directory of the American Hospital Association (AHA), we randomly selected 800 hospitals (sampling rate, 14%), and assessed practices in their coagulation laboratories. This sampling frame is not limited to the AHA members and it includes 95% of all hospitals as indicated by the Online Survey, Certification and Reporting database of CLIA-registered hospital laboratories. Participants had the option of responding via Internet, and 20 (3%) did so. Inconsistent responses were excluded from data analysis.

Results

Response rate. We received returned surveys from 632 institutions, resulting in a response rate of 79%.

Performance of coagulation tests. Of the 629 responding to this question, 612 (97%) reported performing coagulation testing.

Information Requested on Requisition Forms Pertaining to Patient Medication

Forty-six percent (n = 253) of hospitals surveyed stated that they used test requisition forms. Some negative responses may be attributed to ordering coagulation tests electronically without using a paper-based requisition form:

Information Item Requested	Number (%) of Hospital Laboratories
Diagnosis	261 (81%)
Coumadin use	160 (53%)
Unfractionated heparin use	108 (39%)
Heparinoid use	90 (33%)
Low molecular weight heparin use	60 (23%)
Salicylate (Aspirin) use	43 (16%)
Oral contraceptive use	16 (6%)

Reporting Results: Test Report Content

The respondents provided the following test result information, interpretations and recommendations for 4 selected coagulation tests:

Item Reported	PT*	aPTT*	Protein C	vWF* Antigen
Measurement units	592 (97%)	589 (98%)	58 (92%)	38 (90%)
Reference (Normal) interval	591 (97%)	585 (97%)	60 (95%)	39 (93%)
Specimen comments (if needed)	535 (87%)	528 (87%)	48 (76%)	33 (79%)
Therapeutic ranges	331 (54%)	229 (38%)	3 (5%)	2 (5%)
Written interpretation	38 (6%)	24 (4%)	14 (22%)	9 (21%)
Testing methodology/reagent	26 (4%)	23 (4%)	4 (6%)	2 (5%)
Suggested diagnosis	13 (2%)	10 (2%)	6 (10%)	5 (12%)
Possible drug interactions	5 (1%)	7 (1%)	13 (21%)	3 (7%)
No test result interpretation	*179 (29%)*	*182 (30%)*	*19 (30%)*	*14 (33%)*
Recommendations for further testing	11 (2%)	14 (2%)	9 (14%)	5 (12%)
Recommendations for treatment	5 (1%)	4 (1%)	2 (3%)	2 (5%)
Recommendations to test family members	1 (0.2%)	1 (0.2%)	5 (8%)	4 (10%)
No recommendations	*312 (51%)*	*302 (50%)*	*29 (46%)*	*20 (48%)*

*PT, prothrombin time; aPTT, activated partial thromboplastin time; vWF, von Willebrand factor

The information items most frequently provided on coagulation laboratory test reports were measurement units, reference intervals, and specimen comments. Adjusted dose and therapeutic heparin require anticoagulant monitoring with a defined therapeutic range (*Arch Pathol Lab Med.* 1998;122:782798). Items least often provided by the respondents on coagulation reports for PT, aPTT, vWF antigen and protein C were possible drug interactions, suggested diagnosis, testing methodology/reagents, therapeutic ranges for protein C and vWF antigen, written interpretation, and recommendations for (1) further testing, (2) treatment, and (3) testing of family members. These results suggest a need for further research to determine how coagulation laboratories are providing relevant information, interpretations and recommendations to those involved in patient care.

Reporting of Critical ('Panic') Values

One percent of the respondents did not report critical values for coagulation tests (P = 0.025). Of those stating that they did, the following practices in reporting critical values were noted:

Laboratory Practice	Number (%) of Hospital Laboratories
Critical values telephoned to clinician and call documented	585 (99%)
Critical values repeated and documented as confirmed	511 (91%)
Critical values telephoned to clinician and call not always documented	29 (6%)
Critical values indicated on report and no further action taken	24 (5%)

The CLIA regulations and the College of American Pathologists require laboratories to have critical (panic) values and, when critical values are obtained, to inform medical staff immediately so that appropriate action can be taken (Am J Clin Pathol. 1998;109:589594). According to the CLIA regulations, the laboratory must immediately alert the individual or entity requesting the test and, if applicable, the individual responsible for using the test result when any test result indicates an imminently life-threatening condition, or panic or alert values. [CDC. *CLIA Subpart K Quality Systems for Non-Waived Testing*. http://www.phppo.cdc.gov/clia/regs2/subpart_k.asp#493.1291. Sec. 493.1291(g)].

We found that 99% stated that they reported critical values for coagulation tests. In a 1996 survey of Canadian medical laboratories (*Am J Clin Pathol*. 1998;109:589-594), 75% of laboratories reported critical results by telephone.

Summary

- A survey of coagulation testing practices was administered to a random sampling of hospital laboratories.
- Variation was found in the information requested about patient medications.
- Reports for coagulation tests vary widely. Items not consistently included in the report were
  - recommendations for further testing,
  - treatment options,
  - recommendations for testing of family members,
  - written interpretation,
  - suggested diagnosis,
  - therapeutic ranges,
  - possible drug interactions, and
  - testing methodology/reagent.

Of those responding, 29%-33% provided no result interpretation and 46%-51% provided no testing/treatment recommendations.

The vast majority (99%), but not all, reported critical values for coagulation tests.

Concluding Remarks

Limitations

Various laboratory practices noted in this survey are those that have been reported; and like any other surveys, they may not reflect actual practices. Surveys are subject to framing biases which can be reduced (e.g., by pilot testing) but not totally avoided.

Generalizability

Due to the high response (79%) and sampling (14%) rates, results of this survey appear to be generalizable.

In conclusion, we found variations and departures from certain recommended laboratory practices.